1567008 PROVISIONAL SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 2

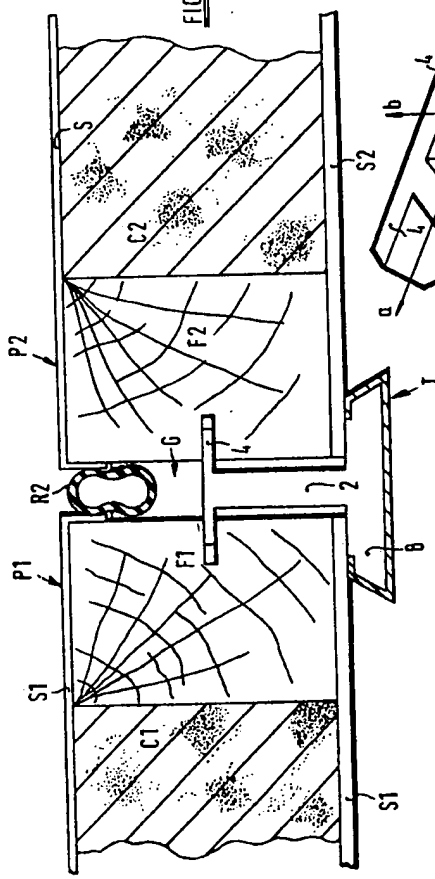
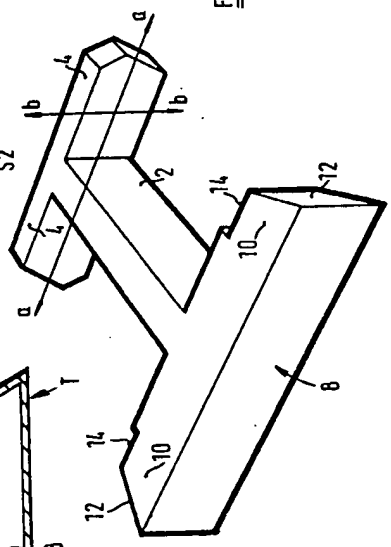


FIG. 4



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(72) Inventor: JOHN NORMAN EDWARDS

(19)

(54) IMPROVEMENTS RELATING TO THE INTERCONNECTION OF PANEL STRUCTURES OR THE LIKE

(71) We, PRESCO INTERNATIONAL LIMITED, a British Company of Newtown, Montgomeryshire, do hereby declare this invention to be described in the following statement:-

This invention is concerned with improvements relating to the interconnection of panel structures or the like.

In the building industry, that which is known as the Module Building System is widely becoming used. In this system, a wall is provided by a plurality of panel structures secured in side-to-side vertical relationship to upper and lower supporting beams to provide a wall, for example an exterior wall, of the building.

Such panel structures typically comprise a wood frame and a central core of insulating material such as a plastics foam, the frame and core being faced at the front and back with a thin metal skin (e.g. steel or aluminium) or a thin panel of plywood. Typically, such panel structures are nine foot in length and three foot wide.

Whereas by virtue of being secured to the upper and lower supporting beams (which may conveniently be secured to a building roof and floor, respectively) such as by screws passing through the frame and into the beams (if the beams are of wood) adjacent panel structures are restrained against relative vertical movement, it is advantageous to provide locking means to restrain adjoining panel structures, at adjacent side edges thereof, against relative movement in a horizontal direction normal to the plane of the panel structures.

It is desirable that such locking means be easy to remove, to enable one panel structure to be removed from an assembly of adjacent panel structures with minimal difficulty and with minimal interference with the adjacent panel structures. Furthermore, it is a requirement that such locking means should not extend wholly from an outside to an inside face of the panel structures, and should be capable of receiving a trim strip to bridge the gap between adjacent panel structures.

Heretofore such means has in general been satisfactorily achieved only with considerable complication, and/or expense of parts and equipment.

This invention provides a method of interconnecting adjacent panel structures which are secured at their upper and lower end portions to appropriate cross-beams with a gap between adjacent side edges of the panel structures, said method involving the use of a locking member having a stem from one end portion of which a pair of teeth extend generally radially outwardly in opposing directions, and including the steps

(a) inserting said one end portion of the stem between said adjacent side edges, and moving the member into a disposition in which the longitudinal axis of the stem extends generally at right angles to the plane of the panel structures,

(b) rotating the member about the longitudinal axis so that the teeth are driven through the side edges and into the two panel structures.

This invention also provides a locking member suitable for use in carrying out the method set out in the last preceding paragraph and comprising a stem from one end portion of which a pair of teeth extend generally radially outwardly in opposing directions, and which is provided, at an opposite end portion, with means cooperable with a tool to enable the stem to be rotated about its longitudinal axis.

Preferably said pair of teeth extend diametrically outwardly relative to the longitudinal axis of the stem, the distance between outer end portions of the teeth in a first direction at right angles to the longitudinal axis being greater than the width of the gap, and the thickness of the teeth in a

second direction extending at right angles to said first direction and to said longitudinal axis being less than the width of the gap to allow the teeth to be inserted into the gap between the side edges of adjacent panel structures.

If desired, the stem at least at a portion thereof adjacent to said pair of teeth may be of a circular cross-section, of a diameter equal to or marginally smaller than the width of a gap, to minimise rocking movement of the member when in its locking position, and thus to improve the stability of the assembly of panel structures: alternatively, the stem may comprise a portion of polygonal cross-section, the largest distance across said polygon being smaller than the width of the gap.

If desired, the member may comprise a plurality of such pairs of teeth at differing longitudinal positions, all such pairs lying in a longitudinal plane of the stem (that is, extending parallel) to allow all the pairs to be inserted into the gap between the side edges of the adjacent panel structures.

This will provide better resistance to dissimilar movement between adjacent panel structures, and also assists in maintaining the stem equidistant between the two side edges.

Said end portions of the stem remote from the teeth (i.e. that which will be outermost of the panel assembly) and which is provided with means to enable the locking member to be axially rotated by a tool, should allow sufficient force to be exerted to enable the teeth to be driven through the side edges of the two panel structures. If desired, said end portion may be provided by a polygonal formation such as a hexagonal nut portion whereby the member may be engaged by a spanner. Preferably, said end portion of the step opposite the teeth is also provided with means to enable a trim strip of a length sufficient to overlie the entire length of the gap to be clipped thereto (e.g. by a press-stud arrangement).

In use, a plurality (for example, four or five) locking members will be used to secure adjacent structures at spaced intervals along a typical nine foot length. Not only will this provide adequate improvement in the stability of the panel assembly, but also provides a sufficient number of points of attachment of the trim strip to ensure that it is securely retained in a desired position relative to the panel assembly.

Alternatively, said end portion of the stem is provided with a radially outwardly extending head, conveniently provided by diametrically-opposed arms extending parallel with the teeth such that when the membe has been rotated and the teeth have been driven through the side edges of the two panel structures, the arms of the head extend across the gap. Preferably the arms are longer than the teeth: in this way, when the member has been rotated and the teeth brought into an initial engagement with the side edges of the panel structures, immediately prior to their being driven through the side edges, the arms will at that stage overlie the side faces of panel structures to a small extent, and may thereby define an optimum (e.g. central) position for the teeth in a direction extending through the gap. Thus, on rotation of the member, the head may be retained in engagement with the side faces of the panel structures, and thereby improve the stability of the panel assembly. Preferably the head itself provides means which allows the member to be readily axially rotated with the aid of a tool (such as a spanner or the like) by virtue of its shape, and advantageously itself provides means to enable a trim strip to be clipped thereto.

This invention also provides a locking member for use in the interconnection of adjacent panel structures, said member comprising a stem, a pair of teeth extending generally radially outwardly in opposing directions from the stem adjacent an operative end portion of the member, and a head adjacent an opposite end portion of the member, said head providing means whereby the member may be engaged by a tool and rotated about the longitudinal axis of the stem, and means whereby a trim strip may be clipped to the member. Conveniently the member has a uniform transverse cross-section, and is manufactured by a cropping operation from a continuous extrusion. In use, the operative end portion of the stem and the teeth are inserted into the gap between adjacent panel structures, and by the use of a tool applied to the head, the member is rotated to drive the teeth through the side edges of the panel structures. Preferably the head comprises two arms extending diametrically outwardly of the shank, each being preferably at least substantially parallel to one of the teeth, whereby, when the operative end portion of the member is inserted into the gap, engagement between the head and the outer faces of the panel structures adjacent the side edges thereof may determine the degree of axial extent of the member into the gap: on subsequent rotation of the member, and driving of the teeth through the side edges and into the two panel structures, engagement between the head and the outer faces of the panel structures add to the stability of the interconnection, and thus to the assembly of panel structures.

There will now be given a detailed description to be read with refrence to the drawings accompanying the provisional specification of a locking member which is a preferred embodiment of this invention,

and the use of the locking member in the interconnection of two panel structures. It is to be appreciated that the locking member itself, and the method, have both been selected to illustrate this invention by way of example.

In the drawings accompanying the provisional specification:

Figure 1 is a perspective view of said locking member; and

Figure 2 is a horizontal sectional view showing the member in a locking position, interconnecting two adjacent panel structures.

The locking member which is the preferred embodiment of this invention (Figure 1) is conveniently of mild steel, or an aluminium alloy, having been cropped from a continuous extrusion. The member comprises a central stem 2 of generally rectangular cross-section, from one end portion of which (herein referred to as the operative end portion) a pair of teeth 4,4 extend generally radially outwardly, that is in a direction extending at right angles to the longitudinal axis of the stem 2.

Provided at an opposite end portion of the stem 2 is a head 8, comprising two arms 10, 10 extending diametrically outwardly of the stem, each arm 10 being parallel to, and lying in the same radial plane as, one of the teeth 4.

Outer end faces 12, 12 of the two arms 10 are inwardly chamfered, and inside faces of the arms facing the teeth are recessed, as at 14, 14, said recesses extending from the outer faces a short distance towards the longitudinal axis of the stem 2. The arms 10 extend in directions radially of the longitudinal axis somewhat further that the extent of the teeth 4,4.

The locking member is particularly suited for use in the interconnection of two panel structures P1 and P2 (Figure 2), each panel structure comprising a wooden frame F, which bounds a central core C of foam insulating material, a skin S of aluminium sheet facing the front and back of each panel structure.

In the assembly of the panel structures, the two panel structures P1 and P2 are secured at upper and lower end portions thereof respectively to upper and lower cross-beams, in a manner such that a small gap G extends vertically between inside edge faces of the frames F1 and F2 of the panel structures. Upon one side of the panel structurs, a resilient seal R is provided between said side edges.

In the use of the locking member in the interconnection of the panels P1 and P2, said panels are set so that the width of the gap G is less than the distance between outer end portions of the teeth is a first direction $a'a'$ at right angles to the longitudinal axis of the stem, but marginally greater than the thiqkness of the teeth in a second direction $b'b'$ extending at right angles to said first direction and to the longitudinal axis of the shank.

Thus, the operative end portion of the locking member may be inserted into the gap G, with the teeth 4,4 extending generally vertically.

By partial rotation of the member about its longitudinal axis, with said longitudinal axis extending generally horizontally, the teeth 4,4 may be moved into engagement with the side edges of the two panel structures, with the arms 10,10 engaging outside faces of the two panel structures: this allows the operative end portion of the locking member to be inserted into the gap a controlled amount, to ensure that, for example, the teeth engage portions of the frames F1 and F2 at points generally midway through the thickness thereof.

By the use of an appropriately-shaped tool, the head 8 of the locking member may be engaged, and the locking member rotated about its longitudinal axis to bring the teeth 4,4 and arms 10,10 into generally horizontal positions, which movement involves the driving of the teeth 4,4 through the side edges and into the frames F1 and F2 of the two panel structures. Such interengagement between the frames and the teeth, together with abutment between the head 8 and side faces of the panel structures adjacent the gap, minimises tendency for relative movement to occur between said adjacent panel structures in a horizontal direction extending at right angles to the plane of the assembly of panel structures.

In the practice of said method, it is preferred to use some four or five such locking members for secure adjacent panel structures along a typical nine foot length thereof: if desired, each locking member may comprise several pairs of teeth, each pair being substantially co-planar with the pair 4,4 to improve rigidity of the assembly.

Subsequently a trim strip T, of a similar nine foot length, may be clipped onto the locking members, inwardly-facing lips of the trim strip being received within the recesses 14,14 of the side arms 10,10.

To release the adjacent panel structures, it will be appreciated that it is merely necessary to remove the trim strip T, and to turn each locking member about its longitudinal axis so that the teeth are withdrawn from the frames F1 and F2, allowing retraction of the locking members. When this is done on both sides of one panel structure (e.g. the panel structure P2) said panel structure may be withdrawn from an assembly of such panel structures with no interference with the remaining panel structures. Thus, replacement of any panel structure of

such an assembly may be effected simply and quickly, to allow easy replacement of a panel structure should one become damaged in use, or should it be required to replace one panel structure with a window or door.

WHAT WE CLAIM IS:-

1. A method of interconnecting adjacent panel structures which are secured at their upper and lower end portions to appropriate cross-beams with a gap between adjacent side edges of the panel structures, said method involving the use of a locking member having a stem from one end portion of which a pair of teeth extend generally radially outwardly in opposing directions, and including the steps

(a) inserting said one end portion of the stem between said adjacent side edges, and moving the member into a disposition in which the longitudinal axis of the stem extends generally at right angles to the plane of the panel structures;

(b) rotating the member about the longitudinal axis so that the teeth are driven through the side edges and into the two panel structures.

2. A method according to claim 1 wherein the locking member comprises, at an end portion opposite to said one end portion, means co-operable with the tool to enable the stem to be rotated about its longitudinal axis.

3. A method according to one of claims 1 and 2 wherein the said pair of teeth of said locking member extend diametrically outwardly relative to the longitudinal axis of the member.

4. A method according to any one of the preceding claims wherein the distance between outer end portions of the teeth of the locking member in a first direction at right angles to the longitudinal axis of the stem is greater than the width of the gap, and the thickness of the teeth in a second direction extending at right angles to said first direction and to said longitudinal axis is less than the width of the gap.

5. A method according to any one of the preceding claims where at least a portion of the stem of the locking member adjacent to said pair of teeth is of circular cross-section, of a diameter equal to or marginally smaller than the width of the gap.

6. A method according to any one of claims 1 to 4 wherein the stem of the locking member comprises a portion of polygonal cross-section, the largest distance across the said polygon being smaller than the width of the gap.

7. A method according to any one of claims 2 to 6 wherein said means of the locking member co-operable with the tool is provided by a formation of polygonal cross-section at said opposite end portion of the locking member.

8. A method according to claim 7 wherein said formation is hexagonal.

9. A method according to anyone of claims 2 to 6 wherein the said opposite end portion of the stem is provided with a radially outwardly extending head, said head providing said means co-operable with a tool to enable the stem to be rotated about its longitudinal axis.

10. A method according to claim 9 wherein the head comprises diametrically - opposed arms extending parallel with said pair of teeth.

11. A method according to claim 10 wherein the distance between outer end portions of said arms is greater than the distance between end portions of the teeth.

12. A locking member suitable for use in carrying out the method according to claim 1 and comprising a stem from one end portion of which a pair of teeth extend generally radially outwardly in opposing directions, and which is provided, at an opposite end portion, with means co-operable with a tool to enable the stem to be rotated about its longitudinal axis.

13. A locking member according to claim 12 wherein said pair of teeth extend diametrically outwardly relative to the longitudinal axis of the member.

14. A locking member according to one of claims 12 and 13 wherein the distance between outer end portions of the teeth in a first direction at right angles to the longitudinal axis of the stem is greater than a specific distance, and the thickness of the teeth in a second direction extending at right angles to said first direction and to said longitudinal axis is less than said specific distance.

15. A locking member according to any one of Claims 12, 13 and 14 wherein at least a portion of the stem adjacent to said pair of teeth is of circular cross-section, of a diameter equal to or marginally smaller than said specific distance.

16. A locking member according to any one of Claims 12 to 14 wherein the stem comprises a portion of polygonal cross-section, the largest distance across said polygon being smaller than said specific distance.

17. A locking member according to any of claims 12 to 16 wherein said means co-operable with a tool is provided by a formation of polygonal cross-section at said opposite end portion.

18. A locking member according to Claim 17 wherein said formation is hexagonal.

19. A locking member according to any one of Claims 12 to 16 wherein said opposite end portion of the stem is provided with a radially outwardly extending head, said

head providing the means co-operable with the tool to enable the stem to be rotated about its longitudinal axis.

20. A locking member according to Claim 19 as appendant to Claim 13 wherein the head comprises diametrically-opposed arms extending parallel with said pair of teeth.

21. A locking member according to Claim 20 wherein the distance between outer end portions of said arms is greater than the distance between end portions of said teeth.

22. A locking member according to any one of Claims 12 to 21 comprising a plurality of pairs of teeth at differing positions longitudinally of the stem, all such pairs lying in a longitudinal plane of the stem.

23. A locking member according to any one of Claims 12 to 22 wherein there is provided at or adjacent said opposite end portion of the stem, means to enable a trimstrip to be clipped to said member.

24. A locking member for use in the interconnection of adjacent panel structures, said member comprising a stem, a pair of teeth extending generally radially outwardly in opposing directions from the stem adjacent an operative end portion of the member, and a head adjacent an opposite end portion of the member, said head providing means whereby the member may be engaged by a tool and rotated about the longitudinal axis of the stem, and means whereby a trimstrip may be clipped to the member.

25. A method of interconnecting adjacent panel structures when carried out substantially as hereinbefore described with reference to the drawings accompanying the provisional specification .

26. A locking member for use in the interconnection of adjacent panel structures, constructed and arranged substantially as hereinbefore described with reference to the drawings accompanying the provisional specificaion.

FORRESTER, KETLEY & CO,
Chartered Patent Agents,
Rutland House,
148 Edmund Street,
Birmingham, B3 2LD.
- and also at -
Forrester House,
52 Bounds Green Road,
London, N11 2EY.
Agents for the Applicants.

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